

Friday, July 22, 2016 2:44:32 PM

**\*149445\***

AMOD

**\*N900040100\***

Setup Start \*NS1\*

Stop **\*NS2\***

**Start Date:** 9/6/2016      **Start Qty:** 7.00      **\*7\***

**Cust Item ID:**

**Required Date:** 9/15/2016      **Req'd Qty:** 7.00      **\*7\***

**Customer:**

**Reference:**

Run Start \*NR1\*

Approvals: Process Plan: dm Date: 16/07/25 Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Stop \*NR2\*

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

[illegible]

DQA: \_\_\_\_\_ Date: \_\_\_\_\_

## WORK ORDER NON-CONFORMANCE / UPDATE



QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

Work Order update only ☐

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                                                 |  |
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| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Suspected Unapproved <input type="checkbox"/> | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><div style="display: flex; justify-content: space-between;"> <div>           Skid-tube <input type="checkbox"/><br/>           Machining <input type="checkbox"/><br/>           Thermoforming <input type="checkbox"/><br/>           Large Fab <input type="checkbox"/> </div> <div>           Cross tube <input type="checkbox"/><br/>           Small Fab <input type="checkbox"/><br/>           Finishing <input type="checkbox"/><br/>           Composite <input type="checkbox"/> </div> <div>           Water Jet <input type="checkbox"/><br/>           Prod. Eng. Coord. <input type="checkbox"/><br/>           Rec/Store/Packaging <input type="checkbox"/><br/>           Supplier <input type="checkbox"/> </div> <div>           Engineering <input type="checkbox"/><br/>           Quality <input type="checkbox"/><br/>           Other <input type="checkbox"/> </div> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                                                 |  |
| Date : _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Step #: _____                                                                                                                                                                      | QTY Effective : _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  | MRB (QSI042) Approval                           |  |
| Description Work Order Deviation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                    | Disposition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                 |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  | Completed By                                    |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  | Lead hand / Supervisor<br>Approval Verification |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  | QC / QA Coordinator<br>Approval                 |  |
| <b>Root Cause</b><br><div style="display: flex; justify-content: space-between;"> <div>           Environment <input type="checkbox"/><br/>           Design <input type="checkbox"/><br/>           Doc/Data <input type="checkbox"/><br/>           Equip/Tooling <input type="checkbox"/><br/>           Handling/Pre <input type="checkbox"/><br/>           Material <input type="checkbox"/><br/>           Internal Transport <input type="checkbox"/><br/>           Tribal Knowledge <input type="checkbox"/><br/>           LOA <input type="checkbox"/><br/>           Substation <input type="checkbox"/><br/>           Past Expiry Date <input type="checkbox"/><br/>           Misidentified <input type="checkbox"/> </div> <div>           No Re-verification <input type="checkbox"/><br/>           Operator <input type="checkbox"/><br/>           Offset/Setup <input type="checkbox"/><br/>           Supplier <input type="checkbox"/><br/>           Training <input type="checkbox"/><br/>           Use for Testing <input type="checkbox"/><br/>           Poor Information <input type="checkbox"/><br/>           Rushing <input type="checkbox"/><br/>           Product Improvement <input type="checkbox"/><br/>           Process Improvement <input type="checkbox"/><br/>           Manufacturing Process <input type="checkbox"/><br/>           Past Due <input type="checkbox"/> </div> </div> |                                                                                                                                                                                    | <b>FAULT CATEGORY</b><br><div style="display: flex; justify-content: space-between;"> <div>           Pressure/Forced <input type="checkbox"/><br/>           Bending <input type="checkbox"/><br/>           Centre Not Concentric <input type="checkbox"/><br/>           Cracks <input type="checkbox"/><br/>           Crimp/Kink/Ripple/Wave <input type="checkbox"/><br/>           Cuffs <input type="checkbox"/><br/>           Crushing <input type="checkbox"/><br/>           Heat Treat <input type="checkbox"/><br/>           Wave/Twist in Tube <input type="checkbox"/><br/>           Marks/Chatter <input type="checkbox"/> </div> <div>           Temperature/Cure <input type="checkbox"/><br/>           Set-up <input type="checkbox"/><br/>           BOM/Route <input type="checkbox"/><br/>           Broken/Damage/Defect <input type="checkbox"/><br/>           Inspection Incomplete/Unqualified <input type="checkbox"/><br/>           Contamination <input type="checkbox"/><br/>           Countersink <input type="checkbox"/><br/>           Cut Too Short <input type="checkbox"/><br/>           Instructions Incomplete/Unclear <input type="checkbox"/><br/>           Drill Holes <input type="checkbox"/> </div> <div>           Power Loss/Surge <input type="checkbox"/><br/>           Folio/Program <input type="checkbox"/><br/>           Grain <input type="checkbox"/><br/>           Weld <input type="checkbox"/><br/>           Wrong Stock Pulled <input type="checkbox"/><br/>           Out of Sequence <input type="checkbox"/><br/>           Off-set <input type="checkbox"/><br/>           Misabeled <input type="checkbox"/><br/>           Fit/Function <input type="checkbox"/><br/>           Misaligned/off center <input type="checkbox"/> </div> <div>           Positioned Wrong <input type="checkbox"/><br/>           Outside Dimensions <input type="checkbox"/><br/>           Over/Under tolerance <input type="checkbox"/><br/>           Part Incorrect <input type="checkbox"/><br/>           Part Lost/Missing <input type="checkbox"/><br/>           Part Moved <input type="checkbox"/><br/>           Drawing <input type="checkbox"/><br/>           Finish <input type="checkbox"/><br/>           Misread <input type="checkbox"/><br/>           Turning Sequence <input type="checkbox"/> </div> </div> |  |                                                 |  |
| OTHER : <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                                                 |  |

**Work Order ID 149445**

Friday, July 22, 2016 2:44:33 PM

**\*149445\***

Page 2

Item ID: D3560-1

Accept

**\*N900040100\***Setup Start **\*NS1\***

Revision ID:

Stop **\*NS2\***

Item Name: Arm

Start Date: 9/6/2016 Start Qty: 7.00

**\*7\***

Cust Item ID:

Required Date: 9/15/2016 Req'd Qty: 7.00

**\*7\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***Stop **\*NR2\***

| Sequence ID/<br>Work Center ID | Operation<br>Description                    | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp              |
|--------------------------------|---------------------------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|-----------------------------|
| 130                            | QC8- Inspect parts - second check           | 0.00                 |         |        |              | 8             | 0             |                  | DAS<br>20<br>9-89 16-08-15  |
| <b>*130*</b>                   |                                             |                      |         |        |              |               |               |                  |                             |
| QC                             | Memo                                        | 0.02                 |         |        |              |               |               |                  | D/O →                       |
| Quality Control                |                                             |                      |         |        |              |               |               |                  |                             |
| 210                            | Identify as per dwg & Stock Location: _____ | 0.00                 |         |        |              |               |               |                  | DAS<br>6<br>9-89            |
| <b>*210*</b>                   |                                             |                      |         |        |              |               |               |                  | 9107.8 + 904<br>AUG 18 2016 |
| Packaging                      | Memo                                        | 0.01                 |         |        |              |               |               |                  |                             |
| Packaging                      | LOCATION: WA003                             |                      |         |        |              |               |               |                  |                             |
| 220                            | QC21- Final Inspection - Work Order Release | 0.00                 |         |        |              |               |               |                  | DAS<br>21<br>9-89           |
| <b>*220*</b>                   |                                             |                      |         |        |              |               |               |                  | AUG 18 2016                 |
| QC                             | Memo                                        | 0.12                 |         |        |              |               |               |                  |                             |
| Quality Control                |                                             |                      |         |        |              |               |               |                  | DAS<br>21<br>9-89           |

AUG 18 2016

DQA:

Date: 16-08-29



## WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed:

Date: 16/08/19.

Work Order update only ☐

|                                             |                                                      |                                                 |                                                            |                                                |                                                          |                                              |                                      |                        |  |
|---------------------------------------------|------------------------------------------------------|-------------------------------------------------|------------------------------------------------------------|------------------------------------------------|----------------------------------------------------------|----------------------------------------------|--------------------------------------|------------------------|--|
| Work Order: 149445                          |                                                      | DISPOSITION                                     |                                                            | AGAINST DEPARTMENT/PROCESS                     |                                                          |                                              |                                      |                        |  |
| Part No. D3560-1                            |                                                      | Rework <input type="checkbox"/>                 |                                                            | Skid-tube <input type="checkbox"/>             | Cross tube <input type="checkbox"/>                      | Water Jet <input type="checkbox"/>           | Engineering <input type="checkbox"/> |                        |  |
| NCR No. 16-5989                             |                                                      | Scrap <input type="checkbox"/>                  |                                                            | Machining <input checked="" type="checkbox"/>  | Small Fab <input type="checkbox"/>                       | Prod. Eng. Coord. <input type="checkbox"/>   | Quality <input type="checkbox"/>     |                        |  |
|                                             |                                                      | Use-as-is <input checked="" type="checkbox"/>   |                                                            | Thermoforming <input type="checkbox"/>         | Finishing <input type="checkbox"/>                       | Rec/Store/Packaging <input type="checkbox"/> | Other <input type="checkbox"/>       |                        |  |
|                                             |                                                      | Suspected Unapproved <input type="checkbox"/>   |                                                            | Large Fab <input type="checkbox"/>             | Composite <input type="checkbox"/>                       | Supplier <input type="checkbox"/>            |                                      |                        |  |
| Date: 16/08/09                              |                                                      | Step #: 110                                     |                                                            | QTY Effective: 1                               |                                                          |                                              | MRB (QSI042) Approval                |                        |  |
|                                             |                                                      |                                                 |                                                            |                                                |                                                          |                                              | DAS 16 9-89 16/08/09                 |                        |  |
| Description Work Order Deviation            |                                                      |                                                 |                                                            | Disposition                                    |                                                          |                                              |                                      | DAS Completed By       |  |
| Found at inspection that 0.28" Deep         |                                                      |                                                 |                                                            | Acceptable per attached                        |                                                          |                                              |                                      | 44 16-08-09            |  |
| Counter bore measure 0.278"                 |                                                      |                                                 |                                                            | Email From DS to Wm.                           |                                                          |                                              |                                      | 9-89 16/08/09          |  |
| RC. Poor information                        |                                                      |                                                 |                                                            | Reverse on Pools                               |                                                          |                                              |                                      | Lead hand / Supervisor |  |
|                                             |                                                      |                                                 |                                                            | info was added on tool.                        |                                                          |                                              |                                      | Approval Verification  |  |
|                                             |                                                      |                                                 |                                                            |                                                |                                                          |                                              |                                      | DAS 08 9-89 16/08/09   |  |
|                                             |                                                      |                                                 |                                                            |                                                |                                                          |                                              |                                      | QC / QA Coordinator    |  |
|                                             |                                                      |                                                 |                                                            |                                                |                                                          |                                              |                                      | Approval               |  |
|                                             |                                                      |                                                 |                                                            |                                                |                                                          |                                              |                                      | DAS 16 9-89 16/08/09   |  |
| Root Cause                                  |                                                      | FAULT CATEGORY                                  |                                                            |                                                |                                                          |                                              |                                      |                        |  |
| Environment <input type="checkbox"/>        | No Re-verification <input type="checkbox"/>          | Pressure/Forced <input type="checkbox"/>        | Temperature/Cure <input type="checkbox"/>                  | Power Loss/Surge <input type="checkbox"/>      | Positioned Wrong <input type="checkbox"/>                |                                              |                                      |                        |  |
| Design <input type="checkbox"/>             | Operator <input type="checkbox"/>                    | Bending <input type="checkbox"/>                | Set-up <input type="checkbox"/>                            | Folio/Program <input type="checkbox"/>         | Outside Dimensions <input type="checkbox"/>              |                                              |                                      |                        |  |
| Doc/Data <input type="checkbox"/>           | Offset/Setup <input type="checkbox"/>                | Centre Not Concentric <input type="checkbox"/>  | BOM/Route <input type="checkbox"/>                         | Grain <input type="checkbox"/>                 | Over/Under tolerance <input checked="" type="checkbox"/> |                                              |                                      |                        |  |
| Equip/Tooling <input type="checkbox"/>      | Supplier <input type="checkbox"/>                    | Cracks <input type="checkbox"/>                 | Broken/Damage/Defect <input type="checkbox"/>              | Weld <input type="checkbox"/>                  | Part Incorrect <input type="checkbox"/>                  |                                              |                                      |                        |  |
| Handling/Pre <input type="checkbox"/>       | Training <input type="checkbox"/>                    | Crimp/Kink/Ripple/Wave <input type="checkbox"/> | Inspection Incomplete/Unqualified <input type="checkbox"/> | Wrong Stock Pulled <input type="checkbox"/>    | Part Lost/Missing <input type="checkbox"/>               |                                              |                                      |                        |  |
| Material <input type="checkbox"/>           | Use for Testing <input type="checkbox"/>             | Cuffs <input type="checkbox"/>                  | Contamination <input type="checkbox"/>                     | Out of Sequence <input type="checkbox"/>       | Part Moved <input type="checkbox"/>                      |                                              |                                      |                        |  |
| Internal Transport <input type="checkbox"/> | Poor Information <input checked="" type="checkbox"/> | Crushing <input type="checkbox"/>               | Countersink <input type="checkbox"/>                       | Off-set <input type="checkbox"/>               | Drawing <input type="checkbox"/>                         |                                              |                                      |                        |  |
| Tribal Knowledge <input type="checkbox"/>   | Rushing <input type="checkbox"/>                     | Heat Treat <input type="checkbox"/>             | Cut Too Short <input type="checkbox"/>                     | Mislabeled <input type="checkbox"/>            | Finish <input type="checkbox"/>                          |                                              |                                      |                        |  |
| LOA <input type="checkbox"/>                | Product Improvement <input type="checkbox"/>         | Wave/Twist in Tube <input type="checkbox"/>     | Instructions Incomplete/Unclear <input type="checkbox"/>   | Fit/Function <input type="checkbox"/>          | Misread <input type="checkbox"/>                         |                                              |                                      |                        |  |
| Substation <input type="checkbox"/>         | Process Improvement <input type="checkbox"/>         | Marks/Chatter <input type="checkbox"/>          | Drill Holes <input type="checkbox"/>                       | Misaligned/off center <input type="checkbox"/> | Turning Sequence <input type="checkbox"/>                |                                              |                                      |                        |  |
| Past Expiry Date <input type="checkbox"/>   | Manufacturing Process <input type="checkbox"/>       |                                                 |                                                            |                                                |                                                          |                                              |                                      |                        |  |
| Misidentified <input type="checkbox"/>      | Past Due <input type="checkbox"/>                    | OTHER:                                          |                                                            |                                                |                                                          |                                              |                                      |                        |  |

Friday, July 22, 2016 2:44:32 PM

**\*149445\***

**\*D3560-1\***

**Required Date:** 9/15/2016

**Required Qty: 7.00**

| Component Item ID/<br>Item Name | Replacement<br>Item ID | Mfg/<br>Purch | Bin<br>Item | Primary<br>Location | Last<br>Location | Route<br>Seq ID | Unit of<br>Measure | Qty on<br>Hand | Qty per Kit | Total<br>Qty | Qty<br>Issued | Date<br>Issued | Status |
|---------------------------------|------------------------|---------------|-------------|---------------------|------------------|-----------------|--------------------|----------------|-------------|--------------|---------------|----------------|--------|
|---------------------------------|------------------------|---------------|-------------|---------------------|------------------|-----------------|--------------------|----------------|-------------|--------------|---------------|----------------|--------|

f

29.9890

10.27895

\*M6061T6B0 500X05 000\*

**\*\***

6061-T6 Bar .500 x 5.00

**Location**

**Loc Qty**

**Loc Code**

MAT

3.497

m134514

0.667

~~nm~~ nm134533

2.83

MAT001

26,492

m130527

1.545

m131392

0.947

m134984

24

DAS  
44 16-08-09  
9-89

**DAS**  
**14**  
**9-69**

9-69  
16/08/07

11/35377  $\rightarrow$  10.28

217

DQA: \_\_\_\_\_ Date: \_\_\_\_\_



## WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

Work Order update only ☐

|                                                              |                                             |                                                                                                                                                                                    |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                           |                                 |                                   |                                              |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                               |                                        |                                   |                                 |                                               |                               |                                         |                                       |                                   |                                                 |                                                            |                                             |                                            |                                   |                                          |                                |                                        |                                          |                                     |                                             |                                           |                                   |                                      |                                  |                                  |                                           |                                  |                                     |                                        |                                     |                                 |                              |                                              |                                             |                                                          |                                       |                                  |                                     |                                              |                                        |                                      |                                                |                                           |                                           |                                                |               |  |  |  |
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| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____ |                                             | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Suspected Unapproved <input type="checkbox"/> |                                           | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><div style="display: flex; justify-content: space-between;"> <div>             Skid-tube <input type="checkbox"/><br/>             Machining <input type="checkbox"/><br/>             Thermoforming <input type="checkbox"/><br/>             Large Fab <input type="checkbox"/> </div> <div>             Cross tube <input type="checkbox"/><br/>             Small Fab <input type="checkbox"/><br/>             Finishing <input type="checkbox"/><br/>             Composite <input type="checkbox"/> </div> <div>             Water Jet <input type="checkbox"/><br/>             Prod. Eng. Coord. <input type="checkbox"/><br/>             Rec/Store/Packaging <input type="checkbox"/><br/>             Supplier <input type="checkbox"/> </div> <div>             Engineering <input type="checkbox"/><br/>             Quality <input type="checkbox"/><br/>             Other <input type="checkbox"/> </div> </div> |                                           |                                 |                                   |                                              |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                               |                                        |                                   |                                 |                                               |                               |                                         |                                       |                                   |                                                 |                                                            |                                             |                                            |                                   |                                          |                                |                                        |                                          |                                     |                                             |                                           |                                   |                                      |                                  |                                  |                                           |                                  |                                     |                                        |                                     |                                 |                              |                                              |                                             |                                                          |                                       |                                  |                                     |                                              |                                        |                                      |                                                |                                           |                                           |                                                |               |  |  |  |
| Date :                                                       |                                             | Step #:                                                                                                                                                                            |                                           | QTY Effective :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                           |                                 | MRB (QS1042) Approval             |                                              |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                               |                                        |                                   |                                 |                                               |                               |                                         |                                       |                                   |                                                 |                                                            |                                             |                                            |                                   |                                          |                                |                                        |                                          |                                     |                                             |                                           |                                   |                                      |                                  |                                  |                                           |                                  |                                     |                                        |                                     |                                 |                              |                                              |                                             |                                                          |                                       |                                  |                                     |                                              |                                        |                                      |                                                |                                           |                                           |                                                |               |  |  |  |
| Description Work Order Deviation                             |                                             |                                                                                                                                                                                    |                                           | Disposition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                           |                                 |                                   | Completed By                                 |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                               |                                        |                                   |                                 |                                               |                               |                                         |                                       |                                   |                                                 |                                                            |                                             |                                            |                                   |                                          |                                |                                        |                                          |                                     |                                             |                                           |                                   |                                      |                                  |                                  |                                           |                                  |                                     |                                        |                                     |                                 |                              |                                              |                                             |                                                          |                                       |                                  |                                     |                                              |                                        |                                      |                                                |                                           |                                           |                                                |               |  |  |  |
|                                                              |                                             |                                                                                                                                                                                    |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                           |                                 |                                   | Lead hand / Supervisor Approval Verification |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                               |                                        |                                   |                                 |                                               |                               |                                         |                                       |                                   |                                                 |                                                            |                                             |                                            |                                   |                                          |                                |                                        |                                          |                                     |                                             |                                           |                                   |                                      |                                  |                                  |                                           |                                  |                                     |                                        |                                     |                                 |                              |                                              |                                             |                                                          |                                       |                                  |                                     |                                              |                                        |                                      |                                                |                                           |                                           |                                                |               |  |  |  |
|                                                              |                                             |                                                                                                                                                                                    |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                           |                                 |                                   | QC / QA Coordinator Approval                 |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                               |                                        |                                   |                                 |                                               |                               |                                         |                                       |                                   |                                                 |                                                            |                                             |                                            |                                   |                                          |                                |                                        |                                          |                                     |                                             |                                           |                                   |                                      |                                  |                                  |                                           |                                  |                                     |                                        |                                     |                                 |                              |                                              |                                             |                                                          |                                       |                                  |                                     |                                              |                                        |                                      |                                                |                                           |                                           |                                                |               |  |  |  |
|                                                              |                                             |                                                                                                                                                                                    |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                           |                                 |                                   |                                              |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                               |                                        |                                   |                                 |                                               |                               |                                         |                                       |                                   |                                                 |                                                            |                                             |                                            |                                   |                                          |                                |                                        |                                          |                                     |                                             |                                           |                                   |                                      |                                  |                                  |                                           |                                  |                                     |                                        |                                     |                                 |                              |                                              |                                             |                                                          |                                       |                                  |                                     |                                              |                                        |                                      |                                                |                                           |                                           |                                                |               |  |  |  |
| Root Cause                                                   |                                             | FAULT CATEGORY                                                                                                                                                                     |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                           |                                 |                                   |                                              |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                               |                                        |                                   |                                 |                                               |                               |                                         |                                       |                                   |                                                 |                                                            |                                             |                                            |                                   |                                          |                                |                                        |                                          |                                     |                                             |                                           |                                   |                                      |                                  |                                  |                                           |                                  |                                     |                                        |                                     |                                 |                              |                                              |                                             |                                                          |                                       |                                  |                                     |                                              |                                        |                                      |                                                |                                           |                                           |                                                |               |  |  |  |
| Environment <input type="checkbox"/>                         | No Re-verification <input type="checkbox"/> | Pressure/Forced <input type="checkbox"/>                                                                                                                                           | Temperature/Cure <input type="checkbox"/> | Power Loss/Surge <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Positioned Wrong <input type="checkbox"/> | Design <input type="checkbox"/> | Operator <input type="checkbox"/> | Bending <input type="checkbox"/>             | Set-up <input type="checkbox"/> | Folio/Program <input type="checkbox"/> | Outside Dimensions <input type="checkbox"/> | Doc/Data <input type="checkbox"/> | Offset/Setup <input type="checkbox"/> | Centre Not Concentric <input type="checkbox"/> | BOM/Route <input type="checkbox"/> | Grain <input type="checkbox"/> | Over/Under tolerance <input type="checkbox"/> | Equip/Tooling <input type="checkbox"/> | Supplier <input type="checkbox"/> | Cracks <input type="checkbox"/> | Broken/Damage/Defect <input type="checkbox"/> | Weld <input type="checkbox"/> | Part Incorrect <input type="checkbox"/> | Handling/Pre <input type="checkbox"/> | Training <input type="checkbox"/> | Crimp/Kink/Ripple/Wave <input type="checkbox"/> | Inspection Incomplete/Unqualified <input type="checkbox"/> | Wrong Stock Pulled <input type="checkbox"/> | Part Lost/Missing <input type="checkbox"/> | Material <input type="checkbox"/> | Use for Testing <input type="checkbox"/> | Cuffs <input type="checkbox"/> | Contamination <input type="checkbox"/> | Out of Sequence <input type="checkbox"/> | Part Moved <input type="checkbox"/> | Internal Transport <input type="checkbox"/> | Poor Information <input type="checkbox"/> | Crushing <input type="checkbox"/> | Countersink <input type="checkbox"/> | Off-set <input type="checkbox"/> | Drawing <input type="checkbox"/> | Tribal Knowledge <input type="checkbox"/> | Rushing <input type="checkbox"/> | Heat Treat <input type="checkbox"/> | Cut Too Short <input type="checkbox"/> | Mislabeled <input type="checkbox"/> | Finish <input type="checkbox"/> | LOA <input type="checkbox"/> | Product Improvement <input type="checkbox"/> | Wave/Twist in Tube <input type="checkbox"/> | Instructions Incomplete/Unclear <input type="checkbox"/> | Fit/Function <input type="checkbox"/> | Misread <input type="checkbox"/> | Substation <input type="checkbox"/> | Process Improvement <input type="checkbox"/> | Marks/Chatter <input type="checkbox"/> | Drill Holes <input type="checkbox"/> | Misaligned/off center <input type="checkbox"/> | Turning Sequence <input type="checkbox"/> | Past Expiry Date <input type="checkbox"/> | Manufacturing Process <input type="checkbox"/> | OTHER : _____ |  |  |  |
| Misidentified <input type="checkbox"/>                       | Past Due <input type="checkbox"/>           |                                                                                                                                                                                    |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                           |                                 |                                   |                                              |                                 |                                        |                                             |                                   |                                       |                                                |                                    |                                |                                               |                                        |                                   |                                 |                                               |                               |                                         |                                       |                                   |                                                 |                                                            |                                             |                                            |                                   |                                          |                                |                                        |                                          |                                     |                                             |                                           |                                   |                                      |                                  |                                  |                                           |                                  |                                     |                                        |                                     |                                 |                              |                                              |                                             |                                                          |                                       |                                  |                                     |                                              |                                        |                                      |                                                |                                           |                                           |                                                |               |  |  |  |

|                                          |  |                     |         |
|------------------------------------------|--|---------------------|---------|
| <b>DART AEROSPACE LTD</b>                |  | <b>Work Order:</b>  | 149445  |
| <b>Description: Arm</b>                  |  | <b>Part Number:</b> | D3560-1 |
| <b>Inspection Dwg: D3560      Rev: D</b> |  | <b>Page 1 of 1</b>  |         |

### FIRST ARTICLE INSPECTION CHECKLIST

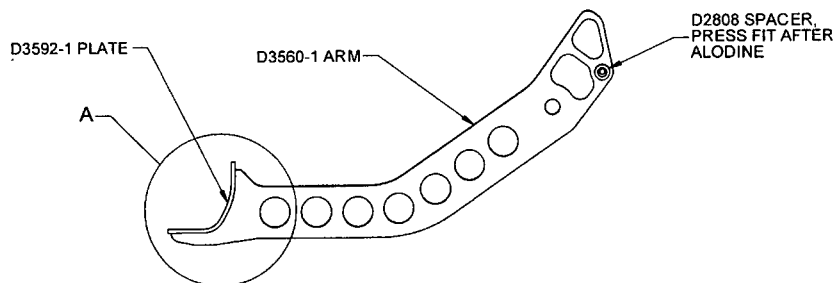
☒ **First Article**
☐ **Prototype**

| Drawing Dimension | Tolerance       | Actual Dimension | Accept | Reject | Method of Inspection | Comments             |
|-------------------|-----------------|------------------|--------|--------|----------------------|----------------------|
| Ø0.507            | +0.000/-0.001   | .5065            | /      |        | Venn                 | FKOH                 |
| Ø0.196            | +0.005/-0.001   | .196             | /      |        | "                    | "                    |
| Ø1.000            | +0.010/-0.001   | 1.005            | /      |        | "                    | "                    |
| 0.500             | +/-0.010        | .501             | /      |        | "                    | "                    |
| 0.250             | +/-0.010        | .250             | /      |        | "                    | "                    |
| 0.275             | +/-0.010        | .274             | /      |        | "                    | "                    |
| 0.188             | +/-0.010        | .191             | /      |        | "                    | "                    |
| 2.000             | +/-0.010        | 1.998            | /      |        | "                    | "                    |
| 1.700             | +/-0.010        | 1.700            | /      |        | "                    | "                    |
| Ø0.385 x 100°     | +/-0.010 x 0.5° | .385 x 100°      | /      |        | "                    | "                    |
| 0.250 Deep        | +/-0.010        | .253             | /      |        | Venn                 | <del>7-78</del> FKOH |
|                   |                 |                  |        |        |                      |                      |
|                   |                 |                  |        |        |                      |                      |
|                   |                 |                  |        |        |                      |                      |
|                   |                 |                  |        |        |                      |                      |
|                   |                 |                  |        |        |                      |                      |
|                   |                 |                  |        |        |                      |                      |
|                   |                 |                  |        |        |                      |                      |
|                   |                 |                  |        |        |                      |                      |
|                   |                 |                  |        |        |                      |                      |
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|                   |                 |                  |        |        |                      |                      |
|                   |                 |                  |        |        |                      |                      |

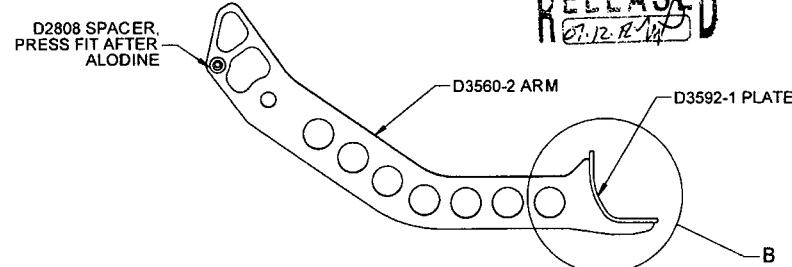
|                                                                    |  |                                                                   |  |                                |  |
|--------------------------------------------------------------------|--|-------------------------------------------------------------------|--|--------------------------------|--|
| <b>Measured by:</b> <b>DAS</b><br><b>44</b><br><small>9-89</small> |  | <b>Audited by:</b> <b>DAS</b><br><b>20</b><br><small>9-89</small> |  | <b>Prototype Approval:</b> N/A |  |
| <b>Date:</b> 16-08-09.                                             |  | <b>Date:</b> 16-08-15                                             |  | <b>Date:</b> N/A               |  |

| Rev | Date     | Change                           | Revised by | Approved |
|-----|----------|----------------------------------|------------|----------|
| A   | 07.01.17 | New Issue P/O D3560-041          | KJ/JLM     |          |
| B   | 07.06.13 | Dimensions updated per Dwg Rev B | KJ/JLM     |          |
| C   | 08.07.24 | Dwg Rev updated                  | KJ/DD      |          |

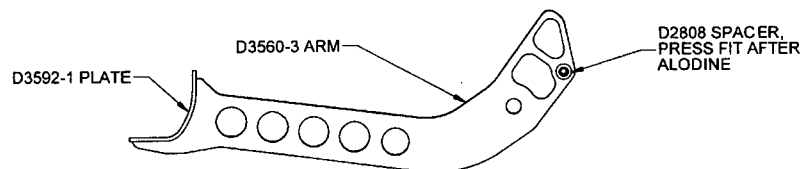
RELEASED  
07.12.16



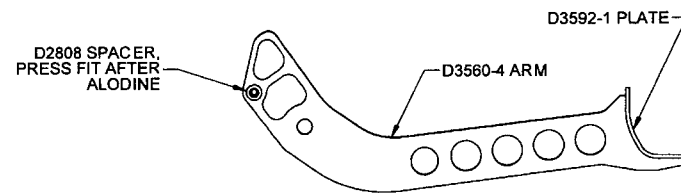
**D3560-041 ARM WELDMENT**



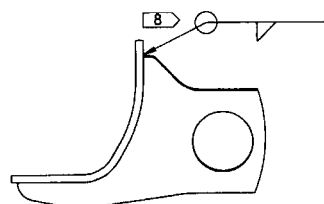
**D3560-042 ARM WELDMENT**



**D3560-043 ARM WELDMENT**



**D3560-044 ARM WELDMENT**



**DETAIL A  
SCALE 1:2**

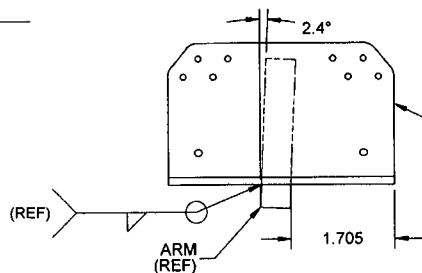
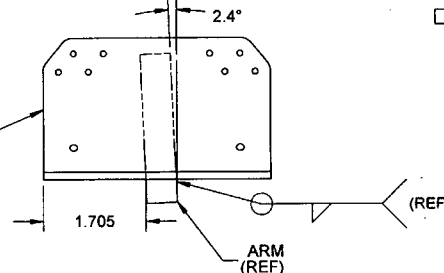


PLATE  
(REF)



**DETAIL B  
SCALE 1:2**

**PARTS LIST**

| QTY<br>-041 | QTY<br>-042 | QTY<br>-043 | QTY<br>-044 | P/N       | DESCRIPTION  |
|-------------|-------------|-------------|-------------|-----------|--------------|
| X           |             |             |             | D3560-041 | ARM WELDMENT |
|             | X           |             |             | D3560-042 | ARM WELDMENT |
|             |             | X           |             | D3560-043 | ARM WELDMENT |
|             |             |             | X           | D3560-044 | ARM WELDMENT |
| 1           | 1           | 1           | 1           | D2808     | SPACER       |
| 1           |             |             |             | D3560-1   | ARM          |
|             | 1           |             |             | D3560-2   | ARM          |
|             |             | 1           |             | D3560-3   | ARM          |
|             |             |             | 1           | D3560-4   | ARM          |
| 1           | 1           | 1           | 1           | D3592-1   | PLATE        |

- NOTES:**  
 1) MATERIAL: N/A  
 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
 3) TOLERANCES: PER DART QSI 018 UNLESS OTHERWISE NOTED  
 4) UNITS: INCHES UNLESS OTHERWISE NOTED  
 5) BREAK SHARP EDGES: 0.005 TO 0.015 MAX  
 6) IDENTIFICATION: N/A  
 7) WEIGHT: 1.23 lbs (TYP)  
 8) WELDING: PER DART QSI 004

|            |                                                 |    |          |
|------------|-------------------------------------------------|----|----------|
| D          | ADD D2808 PRESS FIT NOTE: REDRAWN IN SOLIDWORKS | DC | 07.11.16 |
| C          | REMOVE POWDER COAT                              | CP | 07.06.19 |
| B          | REDESIGN AS WELDMENT, ADD POCKETS               | CP | 07.01.15 |
| A          | NEW ISSUE                                       | CP | 06.09.25 |
| REV.       | DESCRIPTION                                     | BY | DATE     |
| DESIGN     |                                                 |    |          |
| DRAWN      |                                                 |    |          |
| CHECKED    |                                                 |    |          |
| MFG. APPR. |                                                 |    |          |
| APPROVED   |                                                 |    |          |
| DE APPR.   |                                                 |    |          |
| DATE       | 07.11.16                                        |    |          |

**DART AEROSPACE LTD**  
HAWKESBURY, ONTARIO, CANADA

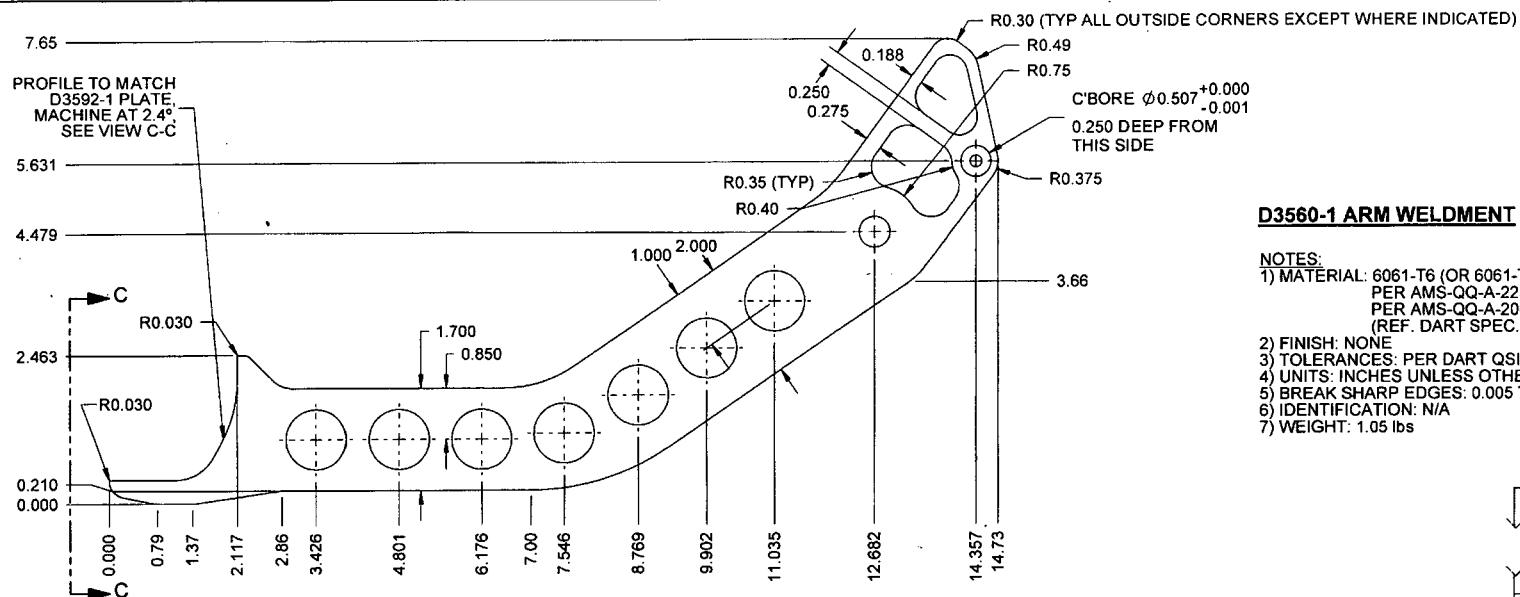
DRAWING NO. **D3560** REV. D  
SHEET 1 OF 5  
TITLE **ARM WELDMENT** SCALE 1:4

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w/o 149445

dm 16/07/25

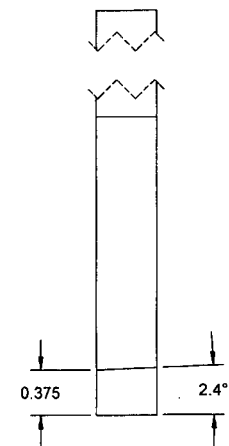




### D3560-1 ARM WELDMENT

#### NOTES:

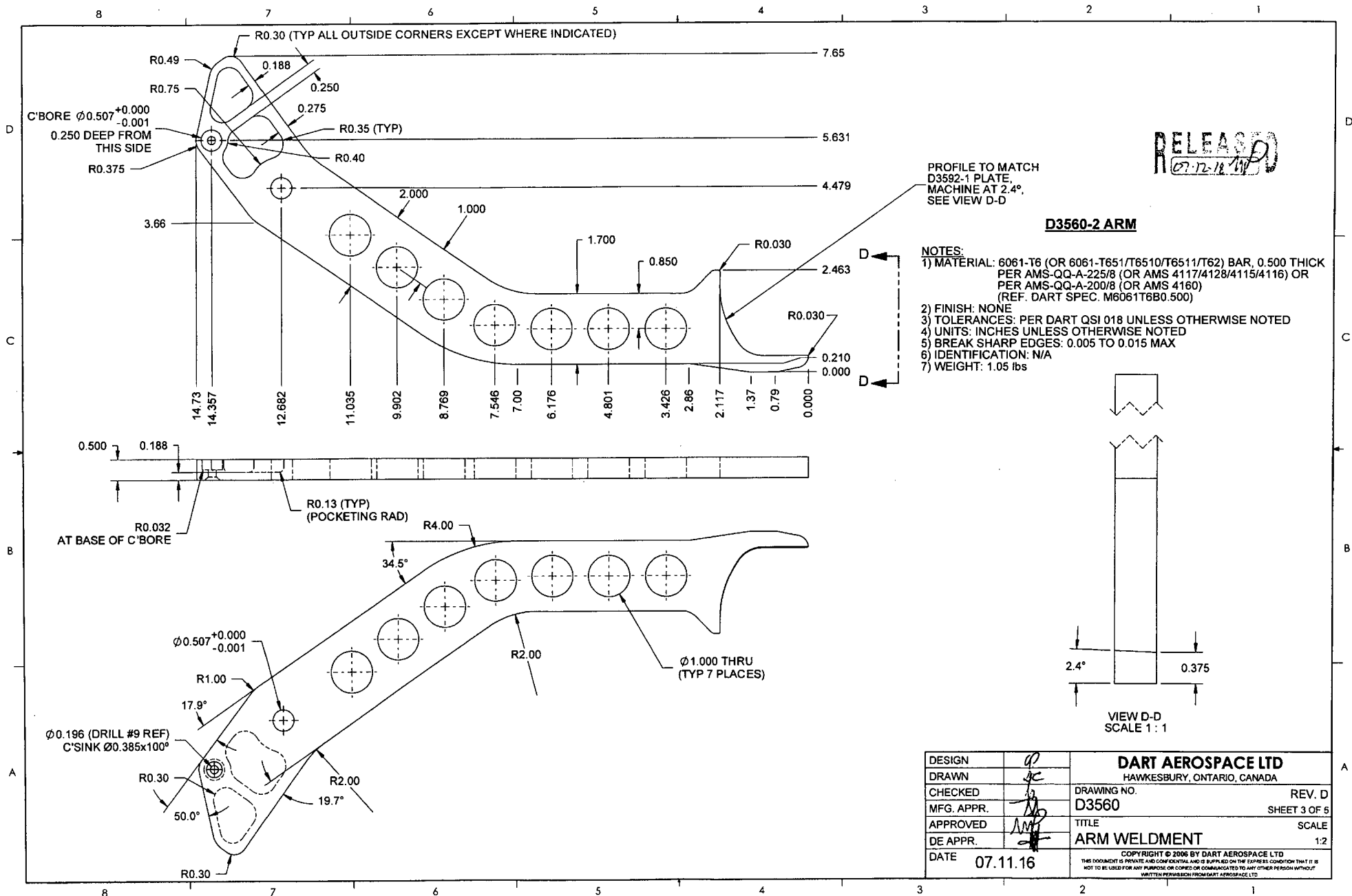
- 1) MATERIAL: 6061-T6 (OR 6061-T651/T6510/T6511/T62) BAR, 0.500 THICK  
PER AMS-QQ-A-225/8 (OR AMS 4117/4128/4115/4116) OR  
PER AMS-QQ-A-200/8 (OR AMS 4160)  
(REF. DART SPEC. M6061T6B0.500)
- 2) FINISH: NONE
- 3) TOLERANCES: PER DART QSI 018 UNLESS OTHERWISE NOTED
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED
- 5) BREAK SHARP EDGES: 0.005 TO 0.015 MAX
- 6) IDENTIFICATION: N/A
- 7) WEIGHT: 1.05 lbs

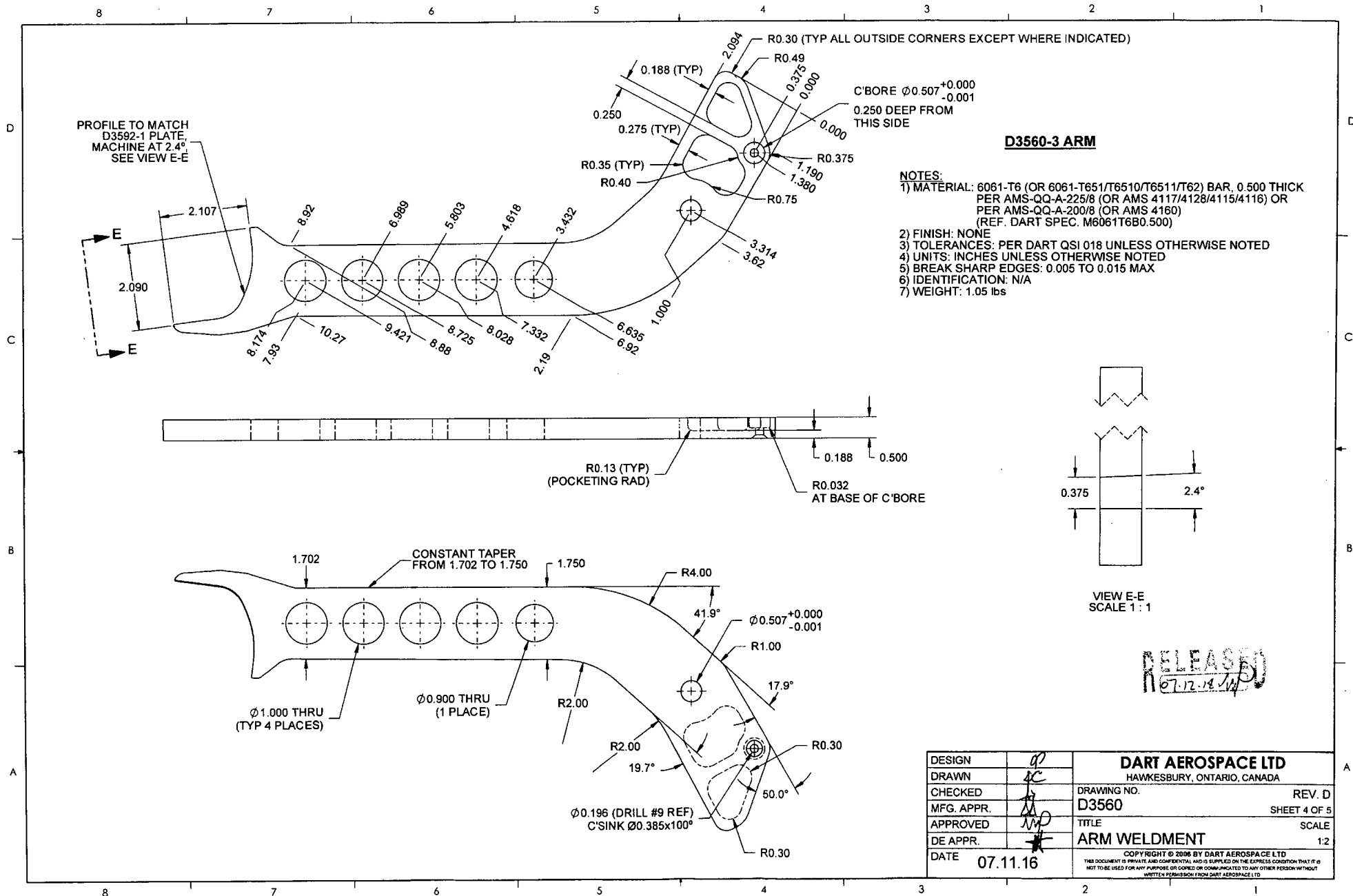


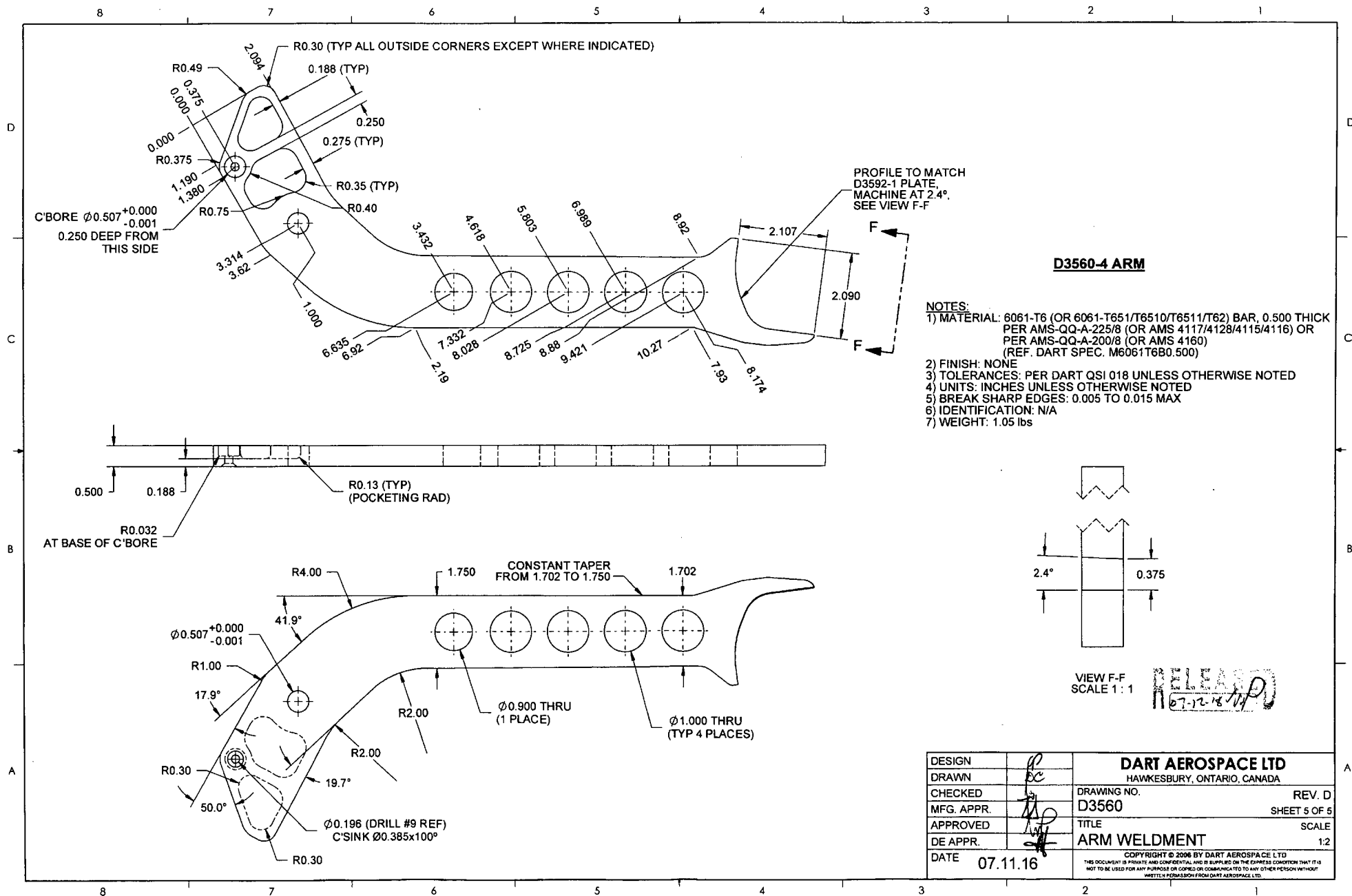
VIEW C-C  
SCALE 1:1

RELEASED  
07.12.16

|            |          |                                                                                                                                                                                                                                                                      |              |
|------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| DESIGN     |          | <b>DART AEROSPACE LTD</b>                                                                                                                                                                                                                                            |              |
| DRAWN      |          | HAWKESBURY, ONTARIO, CANADA                                                                                                                                                                                                                                          |              |
| CHECKED    |          | DRAWING NO.                                                                                                                                                                                                                                                          | REV. D       |
| MFG. APPR. |          | D3560                                                                                                                                                                                                                                                                | SHEET 2 OF 5 |
| APPROVED   |          | TITLE                                                                                                                                                                                                                                                                | SCALE        |
| DE APPR.   |          | ARM WELDMENT                                                                                                                                                                                                                                                         | 1:2          |
| DATE       | 07.11.16 | COPYRIGHT © 2006 BY DART AEROSPACE LTD<br>THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL. IT IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS<br>NOT TO BE USED FOR ANY PURPOSE OR COMMUNICATED TO ANY OTHER PERSON WITHOUT<br>WRITTEN PERMISSION FROM DART AEROSPACE LTD. |              |







## Eric Downing

---

**From:** William Monterroza  
**Sent:** Tuesday, August 09, 2016 3:16 PM  
**To:** Eric Downing  
**Subject:** FW: Deviation on D412-630 part number D3560-1 Arm

Per our conversation, please include this in the work order and I can initial on David's behalf.

Thanks

Will

---

**From:** David Shepherd  
**Sent:** Tuesday, August 09, 2016 12:24 PM  
**To:** William Monterroza <wmonterroza@dartaero.com>; Chris Provencal <cprovencal@dartaero.com>  
**Subject:** RE: Deviation on D412-630 part number D3560-1 Arm

Will,

Thanks for your analysis. I agree that the deviation is acceptable and I am OK with you signing for it on my behalf. Perhaps an extra washer could be inserted underneath the gas spring to make up the gap if necessary.

Regards,  
David

---

**From:** William Monterroza  
**Sent:** August-09-16 8:58 AM  
**To:** David Shepherd <dshepherd@dartaero.com>; Chris Provencal <cprovencal@dartaero.com>  
**Subject:** Deviation on D412-630 part number D3560-1 Arm

This is more for information and if Chris is looking at his emails... otherwise David, this is just for your information and can be addressed when you return.

Operations has an issue with the counter bore hole that attaches to the gas spring was cut 0.278 deep instead of  $0.250 \pm 0.010$ , so it is 0.028 deeper than nominal.

Into this hole is installed the D2808 spacer, the D3595-1 bushing and then the attachment hardware including the D3672-7 phenolic washer.

The hole is at worst case 0.260, but with the deeper hole at .278 it makes the hole out of tolerance by 0.028"

Seems to me that at worst stack up, we would be 0.050" out of tolerance coming from 0.028" (deeper counter bore) + 0.010 (flat of the D3595-1 bushing) + 0.010 (height of the D2808 spacer) + 0.002 (D3672-7 phenolic washer) = 0.050" off the nominal versus what would normally be 0.032"

I am concerned that gas spring does not have spherical bushings and the bolt may not line up or pre-stress the joint if they force in the bolt.

However, over the distance of the spring if full compressed at 4.88", this represents a 1% maximum misalignment, which should be fine.

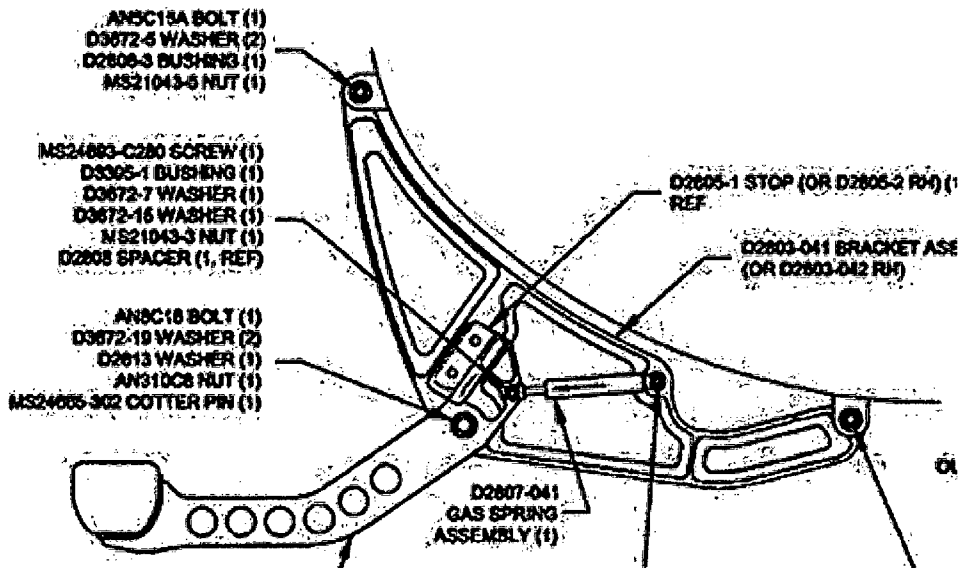
Due to the deeper cut, the remaining material left for the bolt in the D3560 arm is 0.250 which I think should still be sufficient for the stresses required.

Quick and dirty analysis assuming a lug setup:

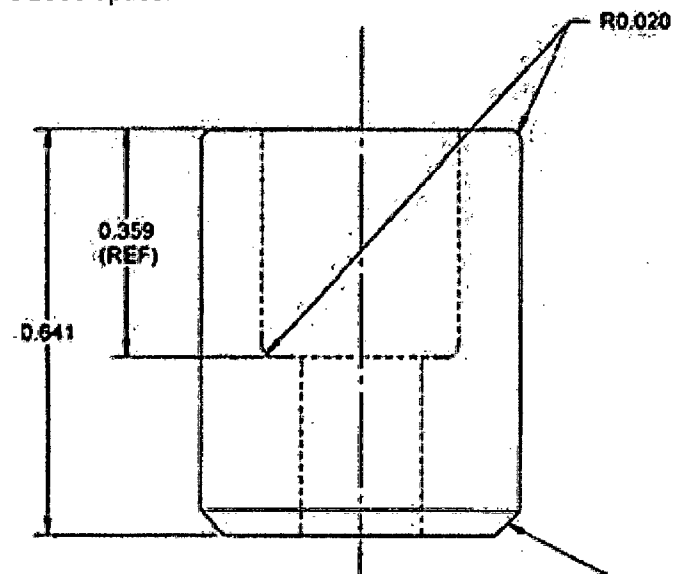
Area = (0.5" hole – 0.196" drilled hole) x 0.250" thickness left.=0.076 in^2  
 Ultimate tensile load Ptu = 45 kpsi ultimate strength for 6061-T6 x 0.078 in^2  
 = 3510 lbs, which is still quite reasonable for the application.

I think the deviation can be signed off as acceptable for use and I will do so at risk of you guys not giving feedback as they do need it asap. Give me a call if you need more clarification – they need it for this afternoon so I will sign it off unless I hear from you.

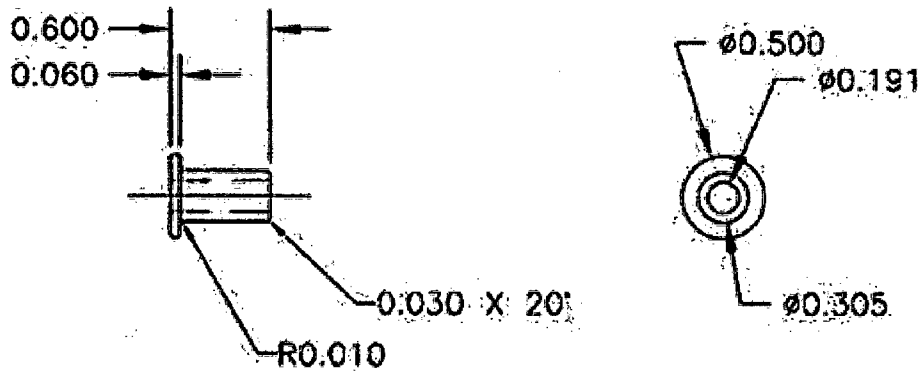
Thanks  
 Will



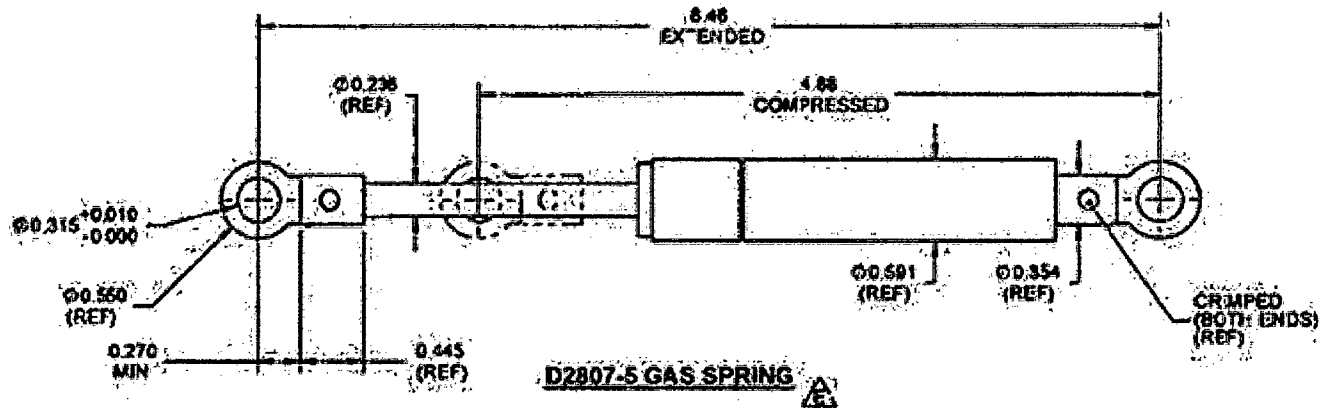
D2808 Spacer



D3395-1 Bushing



D2807-5 Gas Spring



D3562-1 Arm Weldment

